

Claims

1. A transparent conductive multi-layer structure which comprises a smooth base material, a transparent
5 conductive layer formed on the smooth base material by coating, an auxiliary electrode layer formed in a pattern on the transparent conductive layer, and a transparent substrate joined to the transparent conductive layer and auxiliary electrode layer through
10 an adhesive layer; the smooth base material being peelable from the transparent conductive layer.

2. The transparent conductive multi-layer structure according to claim 1, wherein said auxiliary
15 electrode layer has a pattern in the shape of a lattice, the shape of a mesh, the shape of a honeycomb, the shape of parallel lines or the shape of the teeth of a comb.

3. The transparent conductive multi-layer
20 structure according to claim 1 or 2, wherein said auxiliary electrode layer comprises at least one selected from fine metal particles, fine carbon particles and fine ruthenium oxide particles, or at least one selected from fine metal particles, fine
25 carbon particles and fine ruthenium oxide particles and a binder component.

4. The transparent conductive multi-layer structure according to any one of claims 1 to 3, wherein said auxiliary electrode layer comprises a first
5 auxiliary electrode layer formed on the transparent conductive layer and a second auxiliary electrode layer formed on the first auxiliary electrode layer; said first auxiliary electrode layer comprising at least one
10 particles and fine ruthenium oxide particles and a binder component, and said second auxiliary electrode layer comprising fine metal particles and a binder component.

15 5. The transparent conductive multi-layer structure according to any one of claims 1 to 4, which further comprises a transparent coat layer formed by coating between i) said auxiliary electrode layer and said transparent conductive layer at its areas standing
20 not covered with said pattern-shaped auxiliary electrode layer and ii) said adhesive layer.

6. The transparent conductive multi-layer structure according to any one of claims 1 to 5, wherein
25 said transparent conductive layer comprises conductive fine oxide particles of from 1 to 100 nm in average

particle diameter and a binder component.

7. The transparent conductive multi-layer structure according to any one of claims 1 to 6, wherein
5 said transparent conductive layer has been subjected to rolling to make the conductive fine oxide particles dense.

8. The transparent conductive multi-layer
10 structure according to any one of claims 1 to 7, wherein said adhesive layer is mixed with at least one additive selected from an ultraviolet absorber, a dehydrating agent and a deoxidizer.

15 9. A process for manufacturing a transparent conductive multi-layer structure, which comprises:
coating a smooth base material thereon with a transparent conductive layer forming coating fluid prepared by dispersing conductive fine oxide particles
20 in a solvent, followed by drying and optionally curing to form a transparent conductive layer; a base material peelable from the transparent conductive layer being used as the smooth base material;

forming an auxiliary electrode layer in a pattern
25 on the transparent conductive layer; and
joining with an adhesive a transparent substrate

to the auxiliary electrode layer formed and to the transparent conductive layer at its areas standing not covered with the auxiliary electrode layer.

5 10. The process for manufacturing a transparent conductive multi-layer structure according to claim 9, wherein, after the coating with said transparent conductive layer forming coating fluid, followed by drying, the transparent conductive layer is subjected to
10 rolling.

 11. The process for manufacturing a transparent conductive multi-layer structure according to claim 9 or 10, wherein said auxiliary electrode layer is formed by
15 printing a auxiliary electrode layer forming paste prepared by dispersing in a solvent or a solvent containing a binder at least one selected from fine metal particles, fine carbon particles and fine ruthenium oxide particles, followed by curing.

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 12. The process for manufacturing a transparent conductive multi-layer structure according to any one of claims 9 to 11, wherein said auxiliary electrode layer and said transparent conductive layer at its areas
25 standing not covered with said pattern-shaped auxiliary electrode layer are coated thereon with a transparent

coat layer forming coating fluid containing a binder,
followed by curing to form a transparent coat layer, and
thereafter said transparent substrate is joined with an
adhesive to the transparent coat layer.

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13. The process for manufacturing a transparent
conductive multi-layer structure according to any one of
claims 9 to 12, wherein said conductive fine oxide
particles of said transparent conductive layer forming
10 coating fluid has an average particle diameter of from 1
to 100 nm.

14. The process for manufacturing a transparent
conductive multi-layer structure according to any one of
15 claims 9 to 13, wherein said transparent conductive
layer forming coating fluid contains a binder.

15. The process for manufacturing a transparent
conductive multi-layer structure according to any one of
20 claims 9 to 14, wherein said adhesive is mixed with at
least one additive selected from an ultraviolet absorber,
a dehydrating agent and a deoxidizer.

16. A device which comprises the transparent
25 conductive multi-layer structure according to any one of
claims 1 to 8, from which the smooth base material has

been peeled off to have the transparent conductive layer and the auxiliary electrode layer which are joined to the transparent substrate through the adhesive layer.

- 5 17. The device according to claim 16, which is a dye-sensitized solar cell or an organic electroluminescent device.